CERTIFICATION OF APPROVAL

INTERFACE DESIGN FOR A DBMS

By

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A project dissertation submitted to the
Information Systems Programme
Universiti Teknologi PETRONAS
In partial fulfillment of the requirement for the
BACHELOR OF TECHNOLOGY (Hons)
(INFORMATION SYSTEMS)

Approved by,

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UNIVERSITI TEKNOLOGI PETRONAS
TRONOH, PERAK
April 2004

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and the original work contained herein have not been undertaken or done by unspecified sources or persons.

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ABSTRACT

This research serves as the initial delivery and as a guideline for the project, which contains an overview of the project background of study, problems that have been identified, and how do the author see the project's usefulness for users of a DBMS. The main objectives of this study is to do research on the usage and effect of Human Computer Interaction (HCI) and the effect of applying it in the User Interface (UI) Design, to review the current DBMS interface and compare it with the proper elements of the UI Design, to produce a new guidelines regarding this area of research and also to produce with the refined prototype of the DBMS interface. For this purpose, the author has chosen the TOAD software, which is a DBMS tool to be compared and analyzed according to the elements and guidelines of HCI. Poor representation of the graphical user interface will lead to confusion and misinterpretation by the users and to overcome the matter, the author will come out with a proper set of guidelines as well as a refined set of interface which is more user-friendly and efficient. In order to accomplish this project, the author has followed the methodology, which begins with the Research/Analysis phase, Conceptual Design phase, Physical Design and ends with User Testing phases. Based on the result and findings, the main factor that contributes to the ineffectiveness of a user interface is the lack of consideration and planning on the design of the user interface as most of the programmers focus on the coding part of the design. This will lead to improper usage of terms and inappropriate metaphors. In conclusion, the importance of the usage and consideration of using HCI in designing the user interface is applicable not only for this project, but to any software developers in developing a useful and efficient programs.

ACKNOWLEDGEMENTS

The author would like to express her most gratitude, to first and foremost, The Almighty Allah, for blessing each and every day of life with joyful experience and healthy mind soul.

The author would also like to extend her sincerest appreciation and thankfulness to her supervisor, Ms. Eliza Mazmee, for her guidance and patience to assist throughout the entire project development. Ms. Eliza Mazmee has given the author a splendid opportunity to work with her as well as giving beneficial tips and opinion on the project.

It has been a gratifying experience to work with peers and other colleagues who has given support and advice as well as invaluable assistance.

Last but not least, to friends and family, who have been there to support the author physically and mentally towards accomplishing this project.

CHAPTER 1
INTRODUCTION

As a person, we might not face any problem accessing and surfing the Internet, and software programs. The eye-catching design and elegant use of colors attracts many users to visit certain websites or computer programs. Interface designers put their best effort to produce efficient yet accessible programs. We could also find numerous articles, books, journals and even websites produced to teach people the rule of thumb on how to develop a good interface.

As a matter of fact, to some it may not be an issue at all. However such minor problem could turn into a major one if not look into thoroughly. Many people consider the primary criterion for a good user interface to be the degree to which it is easy to learn. This is indeed a laudable quality of any user interface, but it is not necessarily the most important.

The goal of the user interface should be foremost in the design process. Consider the example of a visitor information system located on a kiosk. In this case it makes perfect sense that the primary goal for the interface designers should be ease of operation for the first-time user. The more the interface walks the user through the system step by step, the more successful the interface would be.

1.0 Background of Study

The purpose of this project is to perform a research about the best guidelines of Human Computer Interaction (HCI) in developing an effective user interface for a Database Management System (DBMS). Since there are many guidelines in developing an interface, the project will only focus to the most common type of guidelines that will help users to use the prototype through HCI perspective. Guidelines constitute a popular means of providing input for human factors design in the development of interactive computer-based products and services. In recent past, different users have used guidelines to develop interactive computer-based system accessible. The term guidelines are used to

refer to a general rule of thumb, which applies in a particular context for a particular class of computer input/output devices. Usually a guideline is a consolidated statement of existing design wisdom and there is sufficient evidence to support its applicability. This study will also compare the usability of the TOAD software, which is a DBMS tool, while building a prototype of a refined DBMS interface, which applies to the appropriate guidelines of the Human Computer Interaction in designing the User Interface. The concepts include the usage of learnability, usability, metaphors, consistencies, simplicity, prevention and aesthetics.

1.1 Problem Statement

The first impression of any user using a program comes from the interface. For some programmers developing a user interface is just simply building it regardless of any human factors involved. However, there are also programmers that use HCI guidelines in developing their interface but that failed to achieve users' expectation. Interface designers that ignore the human factor in developing an interface will somehow affect the use of the program from the users, meaning that users will not be bothered to use the program again.

The human-computer interface is a fundamental part of making the product more successful, safe, useful and pleasurable to the user. The project is to discover how the use of HCI guidelines helps the users in using a developed UI and compile a guideline for interface designers in order to give a consideration to human factors in developing an interface.

1.1.1 Problem Identification

From the research that has been done, there is no proper interface, which implies all the Human Computer Interaction standards if we are developing the DBMS interface, for example, when accessing the Oracle or MS Access. Should the interface design based on a different paradigm? Some problems faced by the GUI users are as follows:

- Training for users who are not experts, of which will consume a lot of time to use the application.

- Users are unsure of the responsibility and task of the GUI. This might includes customization of reports and displays of collections of data.
- The metaphors are often inappropriate and do not represent the appropriate task as users are more interested in simpler icons that is easier to be interpreted.
- Users have to deal with the database software program, which is often frustrating when the entire query statements that is not unstructured and have to be memorized beforehand.

All of these problems have triggered the author to do an in-depth research on what is appropriate to be included in a DBMS interface and also a standard guideline to be applied when developing the DBMS interface.

Some problems faced by the author are as follows:

- Time constraints to developed the prototype
- Lack of understanding and programming skill to complete the product
- The design part does not consider user as the target audience

1.1.2 Significant of the Project

The significant of this project is the prototype of the interface of a DBMS, which is going to improvise the ease of usage when user has to deal with the database software program, and this covers all types of DBMS such as MS Access, Oracle and such.

The product and guideline of this project will help to give ideas and alternative design especially for the GUI users. Users usually face difficulty using new application due to lack of training or knowledge of the application done by the interface designers which eventually make users shift to another application which is more user-friendly and understandable.

I shall compare with an existing product, TOAD software, which serves the similar purpose. It is used to create, insert, delete and manipulate database using an interface designed specially for Oracle. By comparing it,

the author will then develop a new set of guidelines and apply the guidelines while designing the new prototype for the DBMS Interface.

Here lies the advantage of the interface because the design applies the guideline from the research study. The interface would be a simple, user-friendly, easy to understand and requires little training time for users.

1.2 Objectives and Scope of Study

1.2.1 Scope of Study

There are two different approaches involved in each stage of the development process.

- Research on the importance of HCI

  Research will be carried out on why HCI is important to develop a system and how by integrating it with the UI Design elements will further improvise the efficiency of an interface. It will include comparison of the TOAD software; the author will then develop a refined DBMS interface, which is user-friendlier and easier to understand.

- Development of the prototype

  A prototype of a refined DBMS interface will be analyzed based on the research that has been done in the earlier part and also by applying the guidelines developed.

1.2.2 Objective(s)

1. To do research on the usage and effect of HCI in user interfaces design to the users and its significant and relevancy of applying proper design techniques.
2. To identify and compile a guideline to assist interface designers in developing a user-friendly system and usability of the graphical user interface through product and process. Usability in terms of:
   - Ease of learning
   - High speed of user task performance

- Low user error rate
- Subjective user satisfaction

3. To produce a DBMS interface, which applies to the HCI, guidelines developed and that the interface is independent of any DBMS. Note that, this research is only limited to the appearance of the interface and it does not cover the functionality part of the DBMS.

1.2.3 Relevancy of the project

1.2.3.1 Research Articles

The research is based on the importance of HCI in developing a usable interface and what guidelines to be used in order to utilize the usability of the application developed. The research also looks into suitable designs that are user-friendly for users. It will compare with the TOAD software and come up with a more refined and effective interface to cater all types of users of DBMS. The articles will also support the implementation of the User Interface prototype.

1.2.3.2 Development of Prototype

The design and development of the Interface Design for a DBMS will include the followings but not necessarily limited to it:

1. To have an Interface that applies the design guideline of HCI.
2. To have an Interface that the design is user-friendly for all users.

It is a hope that the prototype will be improved by adding the functionality of the real application further in the future. This is simply to ensure that HCI guideline is use in an effective and efficient way to deliver a user-friendly environment.

1.2.3.3 Feasibility of the Project within the Scope and Time Frame

The product is an interface, which is properly designed for any DBMS, which applies the design guideline obtained through HCI.

The scope of project seems to be feasible for author to complete on time with two outcomes; the guidelines for developing a user-friendly application and the Interface prototype that applies all the proper HCI which integrates with the UI Design elements guidelines.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

There is currently no agreed upon the definition of the range of topics which form the area of Human-Computer Interaction. Human Computer Interaction (HCI) is a subject that links the theories of Human Behavior with the principles of computer systems design. From a computer science perspective, the focus is on interaction and specifically on interaction between one or more humans and one or more computational machines. The classical situation that comes to mind is a person using an interactive graphics program on a workstation.

2.1 What is HCI?

According to **Preece, Jenny Et Al, Human Computer Interaction, Addison-Wesley Pub.CO.UK, 1994, page 1** *"Human Computer Interaction is about designing computer systems that support people so that they can carry out their activities productively and safely"* Whatever the case maybe, HCI is a study of interaction between man and machine, hence Human Computer Interaction. By human it is meant that user be it man or women, individual or group who are using the technology to get the job done. By computer, it is meant that technology ranging from PC to large-scale computer system, a process control system or even an embedded system. As for interaction it is meant by communication between human and computer be it direct or indirect. In other words, Human Computer Interaction (HCI) is a subject that links the theories of Human Behavior with the principles of computer systems design.

2.2 Why is HCI Important?

HCI in computing should not to be taken lightly as it have been shown that a large percentage of the design and programming effort of projects go into the user interface. The Human-Computer Interface (HCI) is a fundamental part of making the product more successful, safe, useful and pleasurable to the user. Without the study of HCI, system designs are likely to be poor and in the case of nuclear processing for instance, poor design can mean decreased safety (which in turn could lead to loss of lives) for users. [3] Downfalls of businesses are likely when office system designs fail and computer games will not sell if it does not excite or entertain users. Below are some examples of if HCI is taken neglected.

2.2.1 Some Consequences of Poor HCI.

Author have done some research on the Internet and found a number of quite spectacular examples of catastrophes, which were partly attributable to poor HCI. For example:

- Three Mile Island nuclear power plant meltdown in 1979
    - Attributed to poor control panel and alarm system design.
- Shooting down of Iranian Airbus, with loss of 290 lives, by USS Vincennes. In ships control room, position and heading shown on one screen, altitude on another where in fact this lead to faulty identification.

- London ambulance system - drivers and operators kept pushing wrong buttons, leading to eventual system overload and breakdown. System abandoned after a few days.

In general, the following have been shown to result from poor interface design:

- Increased mistakes in data entry and system operation.
- Inaccessible functionality.
- User frustration: low productivity and/or under utilization.
- System failure because of user rejection.

Other consequences of poor design task might be [4]:

Impaired task quality:

- Users spend time working out what is happening;
- Trying out inappropriate computer services;
- Starting work again etc.

Or

Excessive costs to users:

- Users feel machine forces them to do tasks in ways they prefer not to (no control)
- Users have to re-learn how to perform tasks

To avoid these shortcomings it is estimated that nowadays nearly a half of software development effort relates to the user interface. Thus it is clear that HCI plays a big role in the design and development of all kinds of systems.

2.3 What is the Aim of HCI?

The aim of HCI is to ***"To optimize the performance of human and computer together as a system."*** In HCI, consideration of users and their environment is given as much emphasis as the technical aspects of getting the machine such as a computer program for instance, to perform certain functions. Foremost is the idea that in a well-designed system, users should not have to adapt to the interface; it should be designed so that it is natural and intuitive for them to learn to use it, instead of all the effort we put in to making people 'computer literate', we should be trying harder to make computers 'people literate'. [2]

2.4 The Goal of Good HCI design.

One of the most important goals of HCI is to achieve usability. Usability can be in the form of [2]:

- Learnability
    - How easy is it to learn how to use the system?
    - How well are the learned skills retained over time?

- Throughput
    - How quickly can the tasks be performed (or, how many people might be needed to perform a task)?
    - What is the user error-rate? How easily can user/system recover from errors?
- Flexibility and
    - How suitable is the system for the expertise of the intended users?
    - Can the system be customized to suit different ways of working and/or different levels of expertise?
- Attitude
    - What is the users' subjective satisfaction with the system?

To begin with, usability- from a slightly more technical viewpoint- is a combination of the following user-oriented characteristics (Shneidermann, 1992)[6]:

- Ease of learning
- High speed of user task performance
- Low user error rate
- Subjective user satisfaction
- User retention overtime

From the research done, author has found out that usability is related to effectiveness and efficiency of the user interface and to the users' reaction to that particular interface.

2.5 The Effects of HCI in User Interface Development

The importance of good User Interface Design can be the difference between product acceptance and rejection in the marketplace. If end-users feel it is not easy to learn, not easy to use, or too cumbersome, an otherwise excellent product could fail. Good User Interface Design can make a product easy to understand and use, which results in greater user acceptance[5]

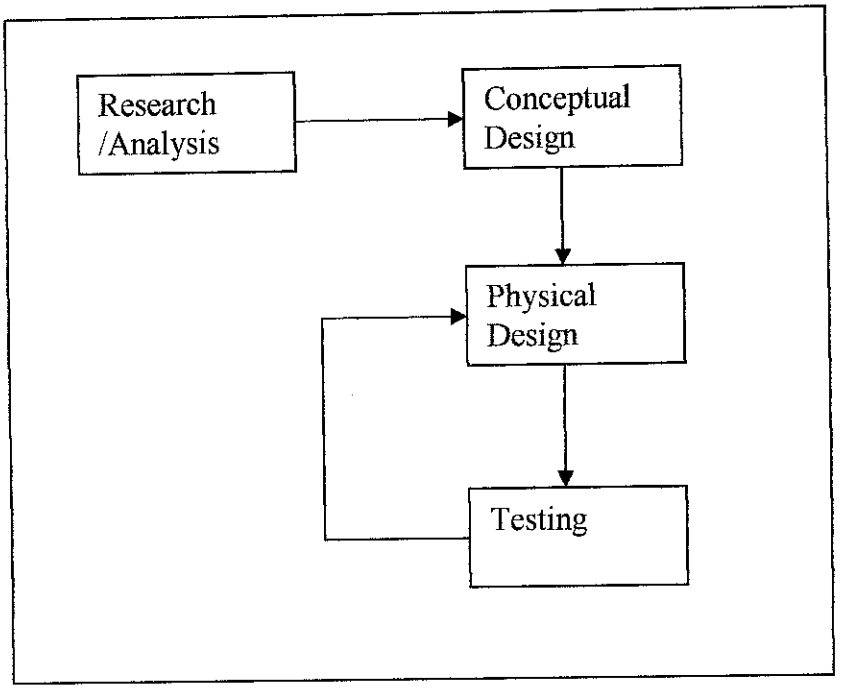
CHAPTER 3

METHODOLOGY/PROJECT WORK

3.0 Procedure Identification

3.0.1 Activities in developing the project.

The logical flows of activities that have been followed throughout the development of the project are as follows:



3.0.1.1 Research / Analysis Phase

Research Analysis

Massive research has been done during the entire stage of the research and analysis. This include, finding relevant journals to back up the project, learn in depth the true meaning in the User Interface Design perspective and also extract all the critical information in order to come out with the guidelines. In the first phase, data is gathered in order to collect all the information that supports the research topics and since this project basically focus on the research part; it is relevant to collect and gather data as well as supported documentation material, which is based on the previous researchers, documentation, and journal from others. The main issues concerned this research includes the effect of the HCI in developing an Interface, the user perception of an Interface and how the elements of the graphical user interface affects the user interface design in general.

Techniques applied in accomplishing the research

a. Collecting facts, data or information from the existing document.

Data are gathered through books, journals as well as Internet articles. Some of these secondary sources of data are based on statistical experiments, case studies and online data. Data gathered are considered useful and critical enough to be used as relevant backups for the research. This information gathering is not limited to this phase, but to the entire phases in accomplishing the project.

b. Preparing Questionnaire 1 as Pretest

This questionnaire (please refer to Appendices-Appendix 1) is prepared to gather user's perception on the existing TOAD software. This questionnaire is prepared to the users who have had at least a one-time experience in dealing with any DBMS.

Comparison and discussion regarding the TOAD Software

TOAD is an industry-standard tool for application development. It lets developers' build, test, and debug PL/SQL packages, procedures, triggers, and functions. TOAD users can create and edit database tables, views, indexes, constraints, users, and roles. Although this application is meant to simplify the task of the users, the application does not interact well with its intended users.

Thus, the author's task is to analyze and criticize the current interface according to the HCI principles. Software interface must be designed to match the needs and wants of users with the capabilities of the program. Obviously, the reason people use computer or program is because they want to complete a task or reach some goal that is more easily and accurately obtained by the use of the program. Some of the areas of comparison include:

Models and Metaphors

Metaphors generally can be classified as terms, images and concepts that are easily recognized, understood and remembered. People are often not aware of their mental models. As referred to the meaning of mental model, metaphors help to assist the mental model functions. Here, the emphasized is on the elements of metaphors as well as how human interpret what they see in front of them.

Survey of users

Users are surveyed using questionnaire (Appendix 1) on what they think about the interface. Any comments and opinion are very much welcomed, as this will be analyzed before coming out with an even proper set of interface. From the data gathered from the said questionnaire, theories can be formulated and this will be shown on the hypothetico-method below.

c. *Hypothetico-Deductive method*

There are seven steps involved in the hypothetico-deductive method applied for this research. The seven steps involved in this research process are observation, preliminary information gathering, theory formulation, hypothesizing, further quantitative and qualitative data collection, data analysis and deduction.

i) Observation

The first stage is observation. During this stage, observation and study on the Human Computer Interaction and the roles of User Interface Design is carried out. All the problems and weaknesses occur due to the misapplied guidelines are identified.

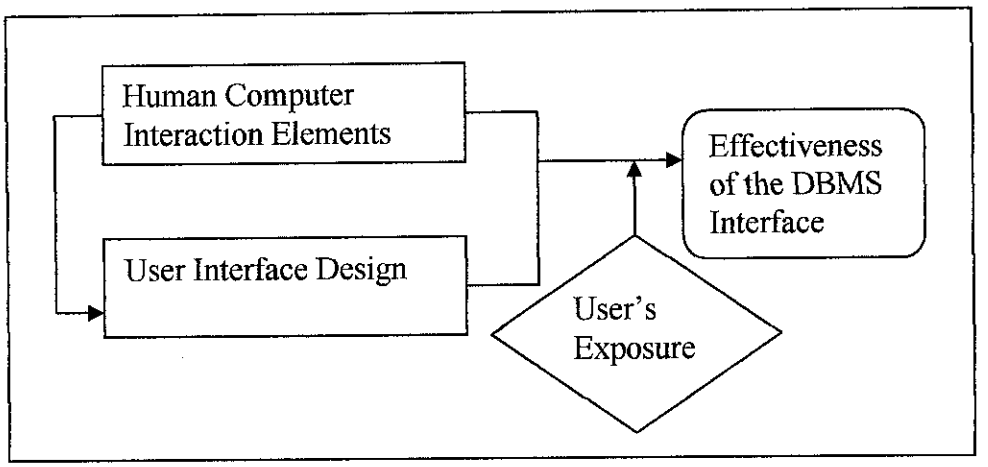
ii) Data Gathering

This refers to this process of narrowing the research topic into something more specific and manageable. For example, as we take a closer interest in the topic of "HCI" we start to look at things that do and do not interest us in this area. As we consider these things we start to generate possible ideas that we might like to investigate further. These can take the form of a "research question or problem". In this case, how relevant is the usage of HCI in designing the user interface. This will lead to the next step which is the theory formulation

iii) Theory Formulation

Theory formulation is an attempt to integrate all the information gathered in a logical manner. In this step the critical variables are examines as their contribution or influence in explaining why the problem occurs and how it

can be solved. The critical variables identified for the research is the relevancy of HCI and how can UI design elements are integrated together with it to improvise the DBMS interface.



Relationships between variables

Both of the critical aspects defined will contribute to the research of the HCI and UI design in creating the DBMS interface.

iv)Hypothesizing

A hypothesis can be defined as a general question or statement that suggests a possible (and therefore testable) relationship between two or more things. The idea of developing a testable hypothesis is a useful step in the research process, mainly because a hypothesis provides both a focus for research and a clearly defined objective for the data collection step (the researcher is going to collect data that will test the hypothesis)

v) Further Quantitative and Qualitative Data Collection

After the development of hypothesis, further data collection is needed to test the hypothesis generated. The distribution of questionnaire to the respondent in real environment has been done and the data will be

gathered for further data analysis. At the same time, interviews and observational surveys will also give additional data to the research.

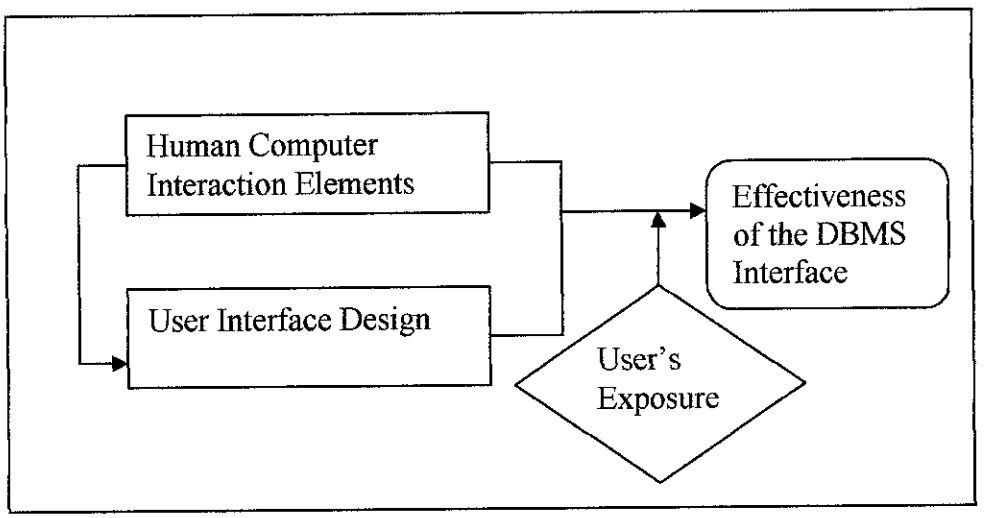
vi) Data analysis

Data are gathered statically analyzed to see if the hypothesis that was generated has been supported or not.

vii) Deduction

Deductive reasoning derives the logically necessary conclusion from the data analysis gathered.

Theory Development in integrating HCI elements into UI Design to improve the DBMS interface



Relationships between variables

The effectiveness of the user interface is very important in order to capture user's attention in using an interface. The study of HCI encompasses many areas especially the ones related to the human. From this perspective, HCI involves the design, implementation and evaluation of interactive systems in the context of the user's task and work. HCI is a multi-disciplinary subject. The ideal designer of an interactive system would have expertise in a range of topics: psychology and cognitive science to give knowledge of the user's perceptual, cognitive and problem-solving skills; ergonomics for the user's physical capabilities and etc. This research is focused on the ergonomics of HCI and the UI design elements in designing interface for a DBMS.

...Ergonomics or a human factor is a study of physical characteristics of the interaction: how the controls are designed, the physical environment in which the interaction takes place, and the layout and physical qualities of the screen... [Dix, Finlay, Abowd, Beale, 1998]

The ergonomics in this research is focused on the arrangement of controls and displays, the usage of colors and interaction styles. These elements will then be combined with the User Interface design, which focused on the user experiences, and expectations, which are when all factors are integrated, will create an improvised and efficient interface for a DBMS. User's experience exposure acts as moderating variable. This variable will affect the relationship between the dependent and independent variables. User's experience and exposure is important since users are the target audience who understand, feel and will determine the output of this research. Thus, user experience moderates the relationship between the HCI elements and the UI Design and the effectiveness of the DBMS interface.

Hypothesis of the DBMS interface

Hypothesis will test whether the theory stated in the theory development is valid or not. In the theory development, there are two factors contributing to the effectiveness of a user interface. These are:

a. Human Computer Interaction elements; human factors.
b. Significance of the User Interface Design

The need to integrate the two main issues here is done by gathering appropriate information, data, research paper, and journals. All these information will contribute to the expected output. The question arises whether does the HCI elements really help in designing an interface and the obvious answer is yes. But do interface designers really consider this aspect and apply it to their designs? This is where the comparison method with the TOAD software is used and how the weaknesses of the interface can be improvised by developing proper guidelines in order for it to be applied in the new refined DBMS interface.

Hypothesis

1. If elements, HCI elements and the UI elements are integrated efficiently, the DBMS interface will produce a refined interface.
2. Usage of colors will effect the user's perception on the interface and how significantly will it affect the interface.
3. Users who have more experienced and more exposure to the areas of the interfaces will be able to detect, discover and feel the weaknesses of the interfaces and the significance of a refined interface.
4. There is a major difference in the TOAD software and the prototype created and many aspects of both HCI and the UI design elements

3.0.1.2 Conceptual Design

This phase concerns with two main issues:

- Developing the guideline to support the research and development of the prototype
- Developing storyboard

a. Developing the guideline to support the research and development of the prototype

In this phase, the author has to derive certain important characteristics of a good interface and produce a standard guideline that can be used by a DBMS designer. The methods used to gather and derive guidelines are by thorough research on journals and articles made by previous researchers.

b. Developing storyboard

After the author has developed the guidelines, the next step is to design the storyboard for the prototype. Note that, all of the design is based on the guidelines, which has been proposed by the author. The storyboard are designed so that the user interface will be easy to learn and effective to use. User interface, which is easy and pleasant to use, are often described as 'user friendly' and has quality. Usability is an abstract concept, but need not be vague. The four main aspects which concern the author are:

- Effectiveness: For a specified range of tasks and users in a particular environment, how effectively can the user understand the tasks that can be performed using the interface? It is also referred to 'productivity'
- Learnability: How much time does the user require before they are effective with the interface?

- Flexibility: To what extent is the interface still effective if there are changes in the task or environment?
- Attitude: Do people experience using the interface as tiring and frustrating, or do they find it rewarding to use, and feel a sense of satisfaction? Do users like the interface?

3.0.1.3 Physical Design

This is the phase where the actual design is done through the usage of proper software. The design is according to the guidelines and the prototype built on previous phase. An area in HCI in which there has been an immense amount of research of how human cognitive capabilities and limitations influence the way human interacts with computers. Some of the keys that would like to be highlighted here when designing the actual interface are:

Limited memory

It is well known that humans can only remember about seven unrelated items of information for short periods of time. If information has to be remembered for long periods of time, substantial effort is needed, and the information has to be transformed into some kind of meaningful code.

Don't make user remember

It is the GUI's designer's responsibility to anticipate what information the user will need at what points in each task, and to ensure that all relevant information is displayed where the user can see it. Showing the user some information, and then asking them to remember what is was two windows later when they can no longer see it, places a memory burden on the user, and should be avoided wherever possible. Asking the user to remember things is a source of strain and errors.

Recognition rather than recall

Human are much better at recognizing items of information, which are presented to them, than at recalling the same items from memory when faced with a blank screen. The interface should be designed to take account of this well-documented characteristic of human memory. Some ways of doing this are obvious, for example, the familiar drop-down list, where a user recognizes the value they want from a list rather than having to remember what the valid values are, how to spell them, etc. However, there are also deeper implications. There is whole question whether the user, just by looking at a window or control, can recognize what they can do with it. For example, if you look at a push-button control, it is easy to recognize that you can push it. In contrast, many GUIs have functionality, which is not visible, or where you would never guess from looking at it what action you can take on it.

Donald Norman introduced the useful term of 'affordances' to describe this phenomenon. Affordances are '...perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing should be used' (Norman 1988). Norman describes the affordances of such everyday objects as door handles, where from just looking at a door you may be able to recognize whether to push or pull, and whether you have to turn the handle or not. Returning to GUI design, the more the user can recognize what actions are available and how to perform then just by looking at a window, the less they have to remember and the fewer errors they will make.

Human make errors

When designing the actual design, the author has to realize that human beings tend not to be consistently accurate, and frequently make errors. Rather than exhausting the user to try harder to concentrate, GUI designers should design the GUI so that it is suitable for use by error-prone users.

There are three ways of doing this:

- Preventing the user from making errors
- Intercepting errors with a helpful error message, which assists the user to perform what they intended or to recover from the error situation.
- Allowing the user to perform an action, see the results, and then change their mind and reverse or 'undo' what they have just done.

3.0.1.4 Testing

There are three steps in completing this phase. The steps are:

- Develop the test plan.
- Conduct the evaluation.
- Collecting Data

Develop the Test Plan

First, the author needs to have a clear definition of the interface goals and purposes. Understand what the user hopes to accomplish and their expectations of the testing by creating scenarios and profiles of the targeted users and what their goals and expectations may be. The author has to draft a list of reasons for the testing and results that needed to be extract at this level.

Conduct the Evaluation

The evaluation is conducted by letting the users play around with the interface and give comments on the design. The author also has to set some questions in order to receive feedback from the users. (Please refer to Appendix 2, Questionnaire 2)

Collecting Data

Observation

Watching the user's behavior is one of the most effective tools of the data collection methods. Often their body language is more revealing than what they say. It is not always easy for users to articulate their reactions to particular elements of the interface.

Explanation

Asking question of the testers, first individually and then in a group discussion setting. Sometimes individuals are reluctant to speak up in a group. However, it is useful to also have a group discussion because the user memory of an experience may be triggered by another user comment.

Thinking Aloud Data

If the user are encourage to think aloud, it will benefit the evaluation process as it will receive a more spontaneous impression of their reaction. It may be a better indication of user's experience.

Questionnaires

Well thought out questionnaires provide a checklist of items for the user and an orientation of the interface purposes and features. (Please refer to Appendix 2)

3.1Tool(s) Required.

Several tools are required to accomplish this research. Basically, the tools required also including the documentation technique as well as the hardware and software used to support both research and prototype.

1. Computer

   Personal Computer with Windows platform

   Windows XP.

2. Prototype

   The interface prototype is developed to support research issues that are highlighted.

3. Questionnaire is constructed during the Conceptual Phase and Evaluation Phase. This type of data gathering technique is very useful as to support the research and to collect user's perception and opinions to assist the development process.

4. Software requirement

   Prototype

   - Macromedia Dreamweaver MX

   Macromedia Dreamweaver MX is one of the most popular user interface prototyping tools designers and a user-friendly multimedia tool. This tool is chosen because of it flexibility and also element of 'ease of use'.

   - Macromedia Flash MX

   This software is used to create and edit icons, images, pictures and others.

   Documentation

   - Microsoft Word 2000

   This word processor is used throughout the project documentation

   - Microsoft Project

   This software is used for project scheduling/timeline.

CHAPTER 4

RESULTS AND DISCUSSION

4.0 Results and Findings

This is the critical and the most important part in the project. All the research and product are presented in this section. Since the target audience for the product is for the end-user, the product must meet the requirement to fulfill their expectation of a system. The sources of collecting data information including the informal interview, the internet, the reference books, newspaper articles, journals and research paper.

4.0.1 Research/ Analysis Phase Results

a. ***Collecting facts, data or information from the existing document***

4.0.1.1 The User-System Interface

The significant role of user interface software in system design poses a special challenge to human factors practitioners, recognized early by Parsons (1970):

. . . What sets data processing systems apart as a special breed? The function of each switch button, the functional arrangement between the buttons, the size and distribution of elements within a display are established not in the design of the equipment but in how the computer is programmed. Of even more consequence, the 'design' in the programs establishes the contents of processed data available to the operator and the visual relationships among the data. In combination with or in place of hardware, it can also establish the sequence of actions, which the operator must use, and the feedback to the operator concerning those actions.

Buttons should be direct and to the point. Anticipate what the users want. In many cases, being too complex can turn user away. If we are posting lengthy blocks of text, keep paragraph to no more than two or three sentences, less is preferable.

Avoid large or busy graphics. Keep each interface of our program clean and well organized. The less the users have to look at, the faster they can perform their task in hand.

4.0.1.2 Common Mistakes in User-Interface Design

Menu bars and other tools that are complex or hard to achieve frequently confuse end-user. These are common mistakes usually made by programmers:

- Programmers do not look into thoroughly on the system to be develop which does not support human users performing defined tasks thus carefully designing of the user-system interface will be needed to ensure effective system operation
- Design of the user-system interface neglect human factors which leads to end-users fails to interact with a computer in order to accomplish tasks to get their jobs done. They differ in ability, training and job experience. They may be keenly concerned with task performance, but may have little knowledge of (or interest in) the computers themselves.
- Do not assume end-users know everything.
- Programmers tends to overdo their design of user interface which instead of supporting people so that they can carry out their activities productively, leads to rejects or poor utilization of the system

The issues of HCI made author think and become more aware of them and perceive things that author do not notice before.

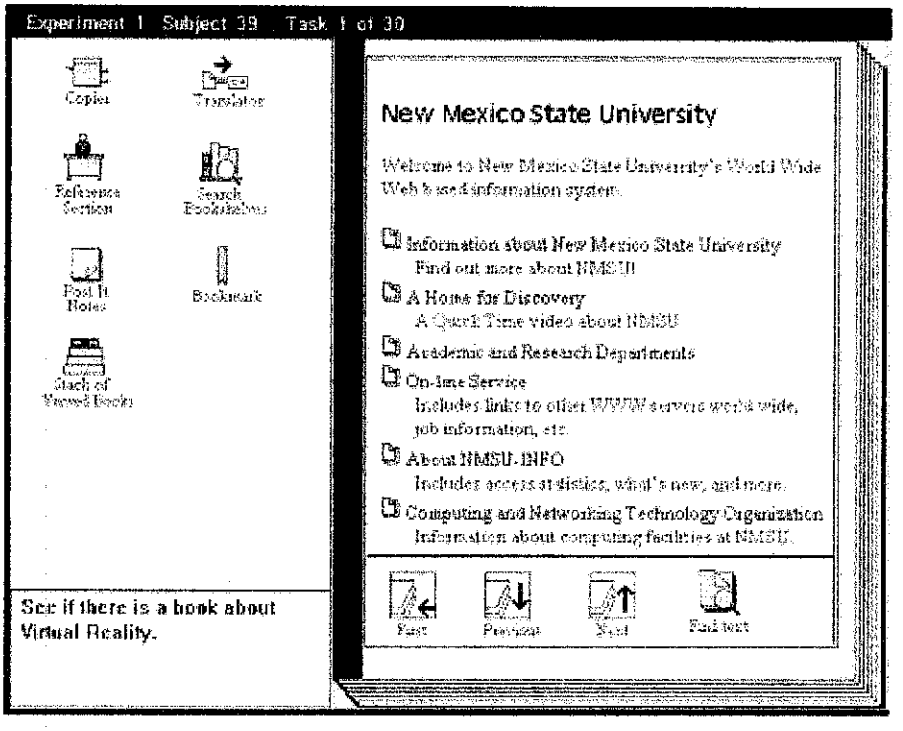
4.0.1.3 Interface Metaphors

Metaphors are everywhere in the user interfaces of today's computers. Software designers are incorporating metaphors into a variety of software from operating systems to information retrieval applications. Technological advances have made more and more realistic depiction of

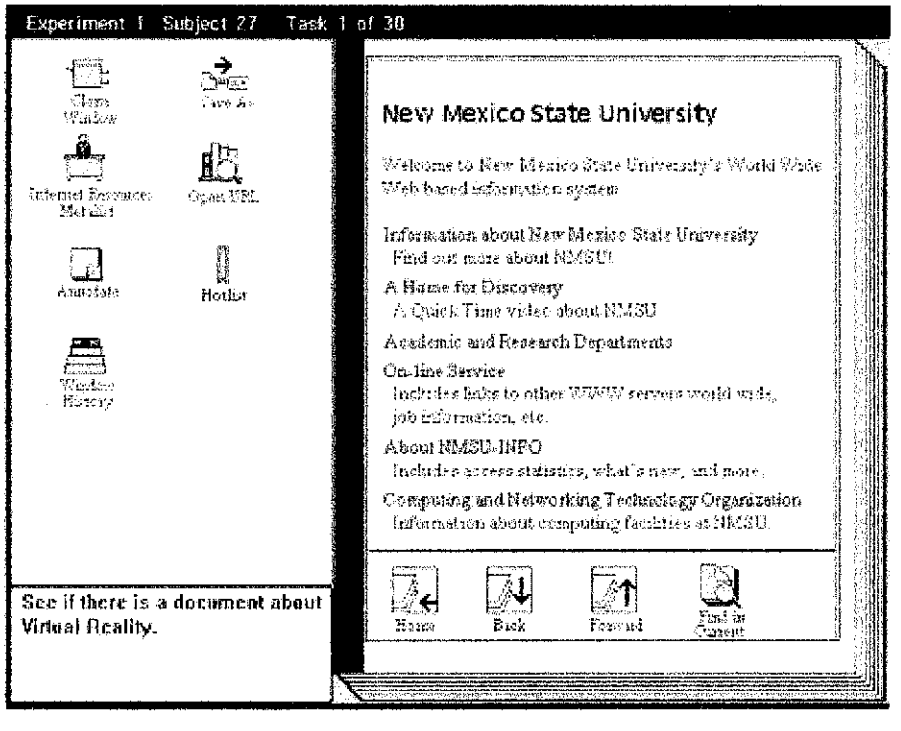
these metaphors possible. However, technological feasibility does not insure psychological utility.

The motivations for using metaphor in the design of user interfaces are similar to the reasons metaphors have long been popular in education. Many educators have observed that giving students comparisons can help them learn. For example, an analogy commonly used in teaching about electricity is "Electricity is like water". Imagine electricity flowing as water does. You can then imagine the wires as pipes carrying water (electrons). It follows that your wall plug can be thought of as a high-pressure source, which can be tapped by inserting a plug [6]. These types of comparisons are also used in teaching in the domain of human-computer interaction. For example, a physical metaphor for electronic storage is to think of "storage locations as buckets." Experimental studies of the effectiveness of metaphor in teaching programming concepts have been conducted. Mayer showed that many programming constructs in BASIC (i.e., memory locations) could be learned more easily when they were presented in the context of a concrete metaphor [10]. Thus, educators in many domains believe that students can import conceptual relations and operations from one domain to another.

Research has demonstrated that there may be great value to teaching about existing computer systems through the use of metaphor (i.e., the text editor is like a typewriter) [10, 11]. Yet, little research has been conducted as to how to design a user interface around a metaphor. Does metaphor provide the same advantage in the domain of user interface design?
In order to support more on the roles of metaphors, there is an experiment to demonstrate a performance advantage provided by the UI metaphor compared to non-metaphoric interfaces. The findings also identify some characteristics that contribute to the effectiveness of metaphor. Below are two interfaces with metaphors and with no-metaphors.

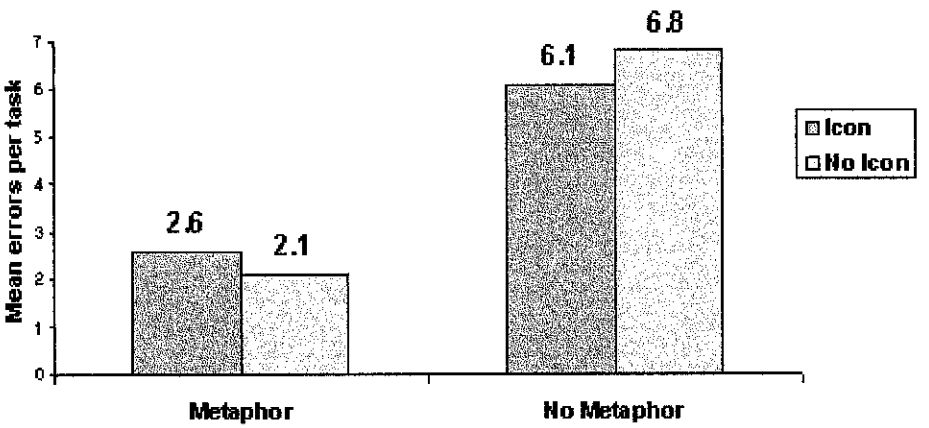


Example task in condition with metaphor and icons



Example task in condition with no-metaphor and icons.

After the experiment is completed, the researchers have made conclusion due to the roles of metaphors. This experiment is based on sample of students. Below is the graph that shows the results of this experiment.



The effects of metaphor and icon on number of errors.

From the above graphs, it can conclude that role of metaphors is really important as a vital elements in a user interface.

b. Hypothetico-deductive method

From the research gathered, it shows that people are more attracted to the interface and also the capabilities of the interface. It is just like when we decided to buy an item by looking at the packaging. Attractiveness is the main concern when we decided to purchase an item and the same goes to the interface design. With this research, which involves the comparison, producing guidelines and developing the prototype, the author would like to highlight certain areas of concerns when designing the DBMS interface.

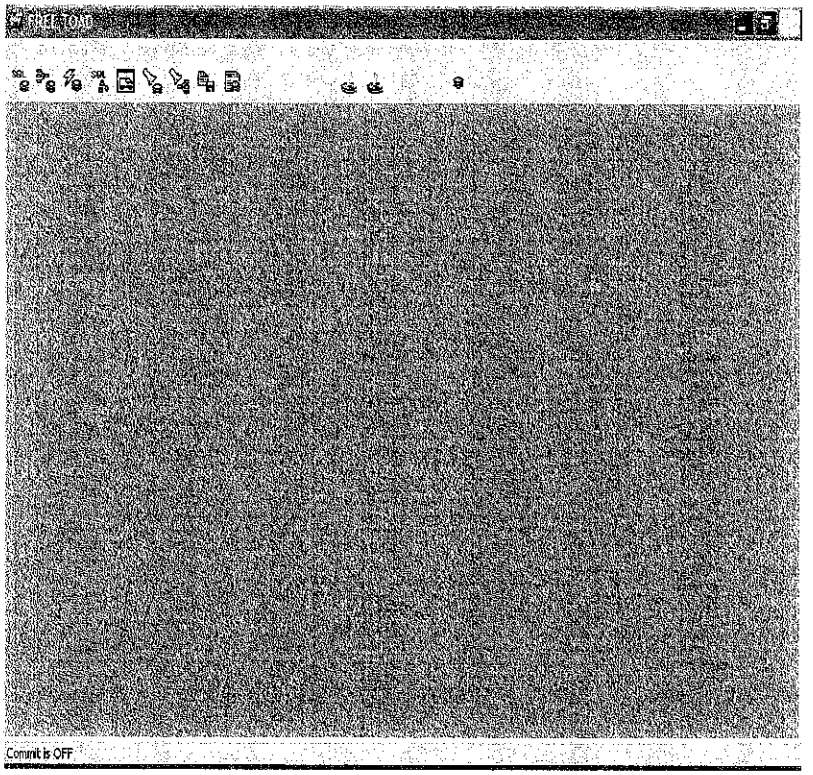
Elements	Comments/Opinion
Icons and metaphors	Icons are small pictures that are generally represent objects in the physical world or are used as metaphors for functions or actions.

Information Organization	The layout should be consistent to avoid confusion and Help menu should be available at every page so that the user would not get lost when interacting with the interface.
Colors	The usage of colors should be appropriate and avoid inappropriate animation and scrolling text.
Error-handling	Pop up messages indicating errors when user did an inappropriate task.

After all the existing data from journal, previous researchers, books as well as the articles that has been analyzed, the next step is to continue the research by comparing the Interface of a TOAD software. This is to further prove that there is a need to have a proper guideline in designing a DBMS interface.

4.0.1.4 Results from comparing with the TOAD Software.

Toad software is a tool for Oracle Application Developers. Although this tool is supposed to simplify a task of a Database Administrator, the software still lack of the user interfaces touch. For example, the tool's GUI is supposed to provide quick access so that the developer may build, test, and debug PL/SQL packages, procedures, triggers, and functions. The main problem here is that, the metaphors used in the software is not appropriate.



User will not know immediately the functions of the buttons. The purpose of using metaphors is to actually allow the user to understand the meaning of the button without having to search for its meaning. Also, Applications should attempt to anticipate the user's wants and needs. Do not expect users to search for or gather information or evoke necessary tools. Bring to the user all the information and tools needed for each step of the process.

The author of the program also does not consider user with color – blindness. Any time you use color to convey information in the interface, you should also use clear, secondary cues to convey the information to those who has problem with color blindness deficiency. The best is to refrain from colors, which are prone to the color – blindness people that are greens and reds. The TOAD program actually played with a lot of green and reds, which make it impossible to for those with color – deficiency.

One more problem faced by the program is that, the buttons are not properly grouped together and there are too many drop-down menus. The drop down menus will distract the user's attention and to find appropriate function of these menus will make the program more time-consuming to use.

The research is also based on the questionnaire 1 (please refer to Appendix 1), which covers the aspect of the interface design on TOAD. For this purpose a sample from 10 user are taken.

Result on Pretest Questionnaire: Graph Construction

Question 1:. **Have you had any experience of using a DBMS interface of any kind?**
Relevance: To ensure that user are aware of the existence of such product.

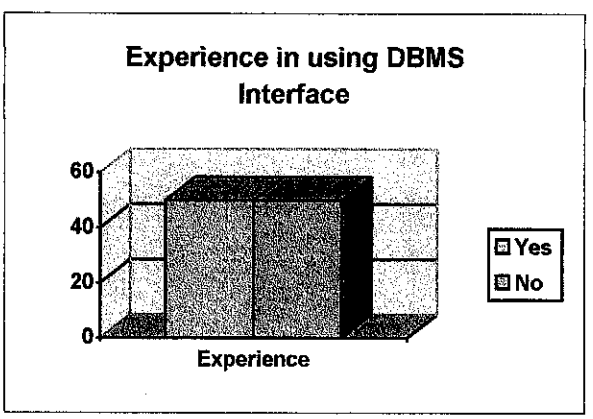


Figure 1

Question 2: **How do you find the interface?**
Relevance: To get user feedback on the TOAD Interface

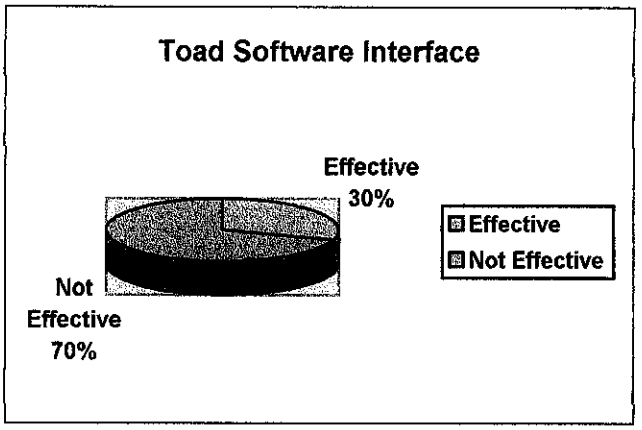


Figure 2

About 70% of the respondents found that the interface of the existing TOAD interface is not effective because of various reasons. The other 30% of respondents found that the interface is effective.

Question 3 and 4: **Do the buttons and icons represent the appropriate task?**

Relevance: To test whether the metaphors and icons are properly selected for user effectiveness.

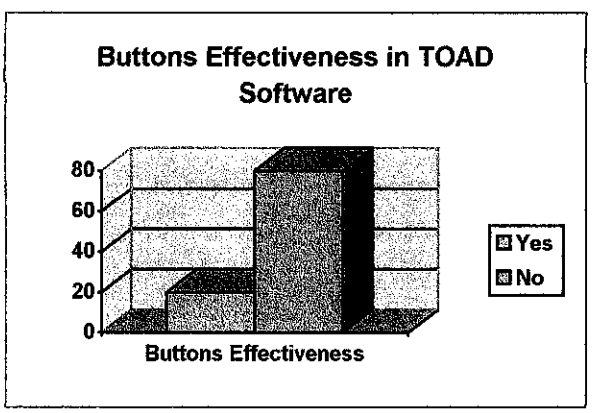


Figure 3

Based on the results, it is clearly shown that the user does not understand the usage of the icons. A large number of user (8/10) said that the buttons

does not clearly project the appropriate task. This is because the buttons are not grouped together according to the task.

Question 5: Is it easy to find information needed in completing a task?
Relevance: To test what is expected from a user of a DBMS interface.

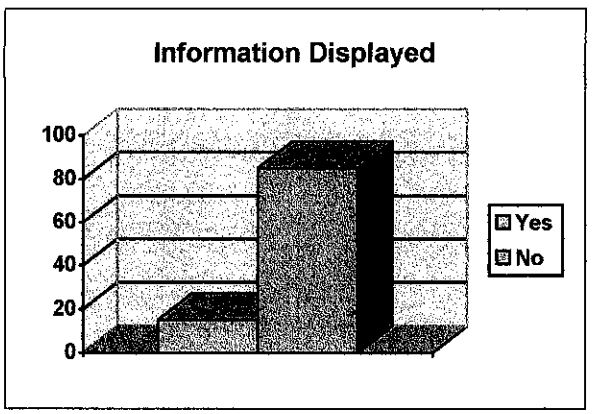
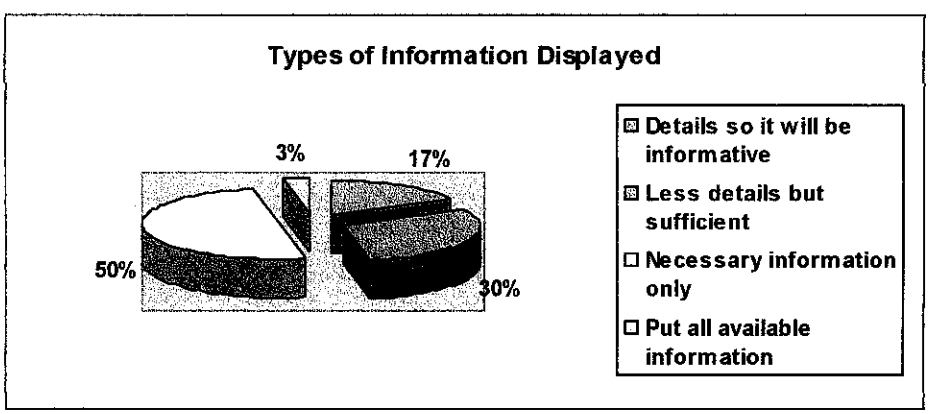


Figure 4

85% of the user has stated that the information needed in accomplishing the task is not useful enough and that the Help menu does not give much help in accomplishing certain tasks.

Question 6: How do you want the information to be displayed on the interface?

Relevance: To perceive user feedback for future development of the prototype.



This pie chart shows the types of information the users prefer to be displayed on the screen. The biggest portion of the respondents prefers to put only necessary information even though in small quantity on the screen. Only 3% of the respondents want to put all available information on the screen. All these analysis is based on the Questionnaire 1 as a pretest evaluation on the TOAD software interface. The questionnaires were distributed to 10 people who are both familiar and not familiar with the TOAD software interface. In short, the author has come out with a conclusion that the effectiveness usage of metaphors is often risky, as user may perceive it in different perspective. Thus, in the development of the prototype, the usage of metaphors will be minimal and with the correct title so that the user will know how to use it.

From the analysis also, the author has an opportunity to further the research by developing specific guidelines for the DBMS interface.

Question 7: Overall, I am satisfied with this interface?

Relevance: To know user's level of satisfaction for the current TOAD software.

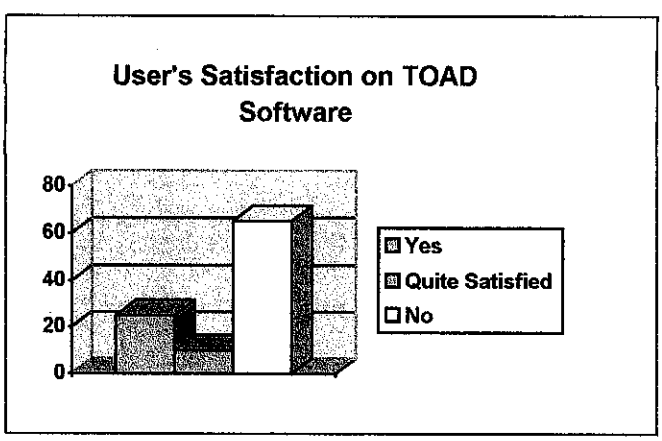


Figure 5

As the conclusion, 65% of the users are not satisfied with the TOAD software, while 10% are quite satisfied and another 25% said that the TOAD software does not satisfy their needs.

Based on these samples, the author will then further the research by developing guidelines which applies to the HCI elements and how it can be integrated with the UI design to further developed a refined DBMS interface.

4.0.2 Conceptual Design Phase Results

4.0.2.1 Developing Guidelines

Another product of the project is the guideline to assist the interface designer to design a user-friendly interface for the end-users. This guideline consists of rules and regulations that need to be followed by interface designers in order to design an application that is user-friendly.

The guideline will cover the second objective of the project. Some of the guidelines are obtained from the research works, which comprises from areas of navigation, display and interaction, organization and globalization.

Until several years ago, there had been no serious attempt to integrate the scattered papers, articles and technical reports that constitute the literature of user-computer interaction. A first step was made, under sponsorship of the Office of Naval Research (ONR), in compilation of an extensive bibliography on this subject (Ramsey, Atwood and Kirshbaum, 1978).

In reviewing the literature, it is apparent that most published reports dealing with the user-computer interface describe applications rather than design principles. A popular early book on the design of user-computer dialogues offered stimulating examples, covering a range of on-line applications, but was disappointing in its failure to emphasize design principles (Martin, 1973).

Although accepted principles for user interface design have not been available, some work has been accomplished toward that end. As

experience has been gained in the use of on-line computer systems, some experts have attempted to set forth principles ("guidelines", "ground rules", "rules of thumb") for design of the user-computer interface. If experts cannot yet assert tested principles for user interface design, they might still offer sensible recommendations as a guide for designers.

In many instances, a stated guideline will be illustrated by one or more examples. When an example includes some sort of imagined computer output, such as an error message, prompt, menu, etc., that output has been marked with enclosing vertical strokes: | sample computer output |

There is no question that specific examples can help clarify a generally worded guideline. Sometimes a reader will say, "I didn't really understand the guideline until I saw the example." But there is a potential hazard in examples. Because any example must be narrowly specific, a reader who relies on that example may interpret the guideline as having a narrower meaning than was intended. It is important to emphasize that examples are presented here only to illustrate the guidelines, and are not intended to limit the interpretation of guidelines.
The guidelines are shown below:

1. Practice User-Centered Design.

User-centered design (Norman & Draper, 1986) has emerged as one of the most compelling mandates for developing user interaction. It is closely related to the notion of behavioral design. User-centered design takes time, effort and expertise. Ted Nelson, creator of the Xanadu hypertext system states:

Designing an object to be simple and clear takes at least twice as long as the usual way. It requires concentration at the outset on how a clear and simple system would work, followed by the steps required to make it come out that way- steps which are much often much harder and complex than

the ordinary ones. It also requires relentless pursuit of simplicity even when obstacles appear which would seem to stand in the way of that simplicity.

(T.H. Nelson, The Home Computer Revolution, 1977, as quoted in Shneidermann, 1992)

2.Designing for the screen, not paper

When designing pictures for online documents:

Pictures should load easily so be aware of how pictures are formatted, the size of the pictures, and the location of the pictures (whether in the online document or in a different file).

Storage requirements will limit the pictures you want to use. To make pictures take up less space, use fewer pictures, make them smaller, use fewer colors, or compress them.

Display graphics with text to help ensure users will look at them because many users won't make the extra effort to view a graphic if it is not located right with the text.

3. Prevent User Errors

Many graphical user interfaces help the user avoid errors by making erroneous choices available. The prototype created will minimize errors and users would not have to worry about creating an error.

4. Optimize User Operations

Designers should strive towards the most effects for the least user effort, by guiding the user on what to do next.

5. Keep the Locus Control with the User

It is vitally important that the user feels in charge at all times, rather than the feeling as if the computer is in charge. The user should have the impression that the computer is prepared to respond whenever the user is ready to issues a command. The user must control the interaction:
Actions should result from explicit user requests.

- Actions should be performed quickly.
- Actions should be capable of interruption or termination.
- The user should never be interrupted for errors.

6. Limit the usage of Opening New Browser Windows

Designers open new browser windows on the theory that it keeps users on their site. But even disregarding the user-hostile message implied in taking over the user's machine, the strategy is self-defeating since it disables the Back button which is the normal way users return to previous sites. Users often don't notice that a new window has opened, especially if they are using a small monitor where the windows are maximized to fill up the screen. So a grayed out Back button will confuse a user who tries to return to the origin.

7. Be Consistent

This rule is the most frequently violated one, but following it can be tricky because there are many forms of consistency. Consistent sequences of actions should be required in similar situations; identical terminology should be used in prompts, menus, and help screens; and consistent color,

layout, capitalization, and fonts, and so on should be employed throughout.

Consistency is one of the most significant factors affecting usability. Users expect certain aspect of an interface to behave in certain ways, when that does not happen it can be very confusing.

8. Keep it Simple

This is certainly not easy to do. Simple tasks can be kept easy by using actions, icons, words and other interaction object that are natural to the user. Don't compromise usability for function. Keep the interface simple and straightforward. Users benefit from function that is easily accessible and usable. A poorly organized interface cluttered with many advanced functions distracts users from accomplishing their everyday tasks. A well-organized interface that supports the user's tasks fades into the background and allows the user to work efficiently.

Basic functions should be immediately apparent, while advanced functions may be less obvious to new users. Function should be included only if a task analysis shows it is needed. Therefore, keep the number of objects and actions to a minimum while still allowing users to accomplish their tasks

9. Make User Actions Easily Reversible.

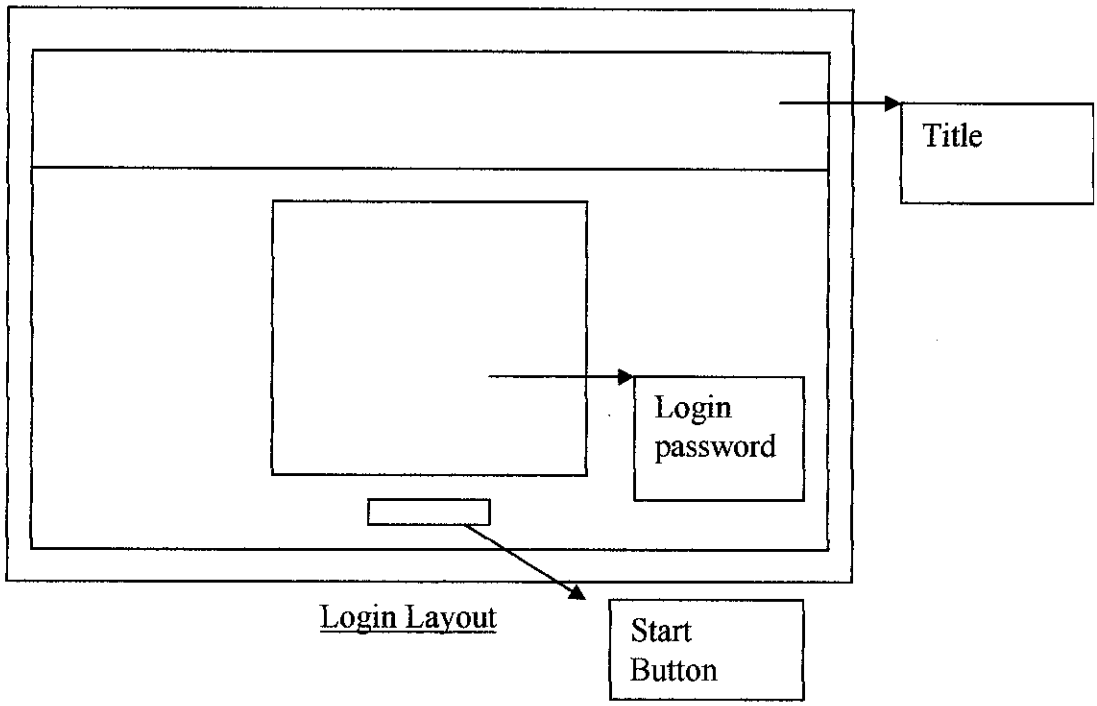
Reversibility applies to actions for navigating through the system, as well as undoing undesirable mistakes or accidental actions done by user. Such mechanism for allowing users easily too reverse their action will encourage exploration of the system.

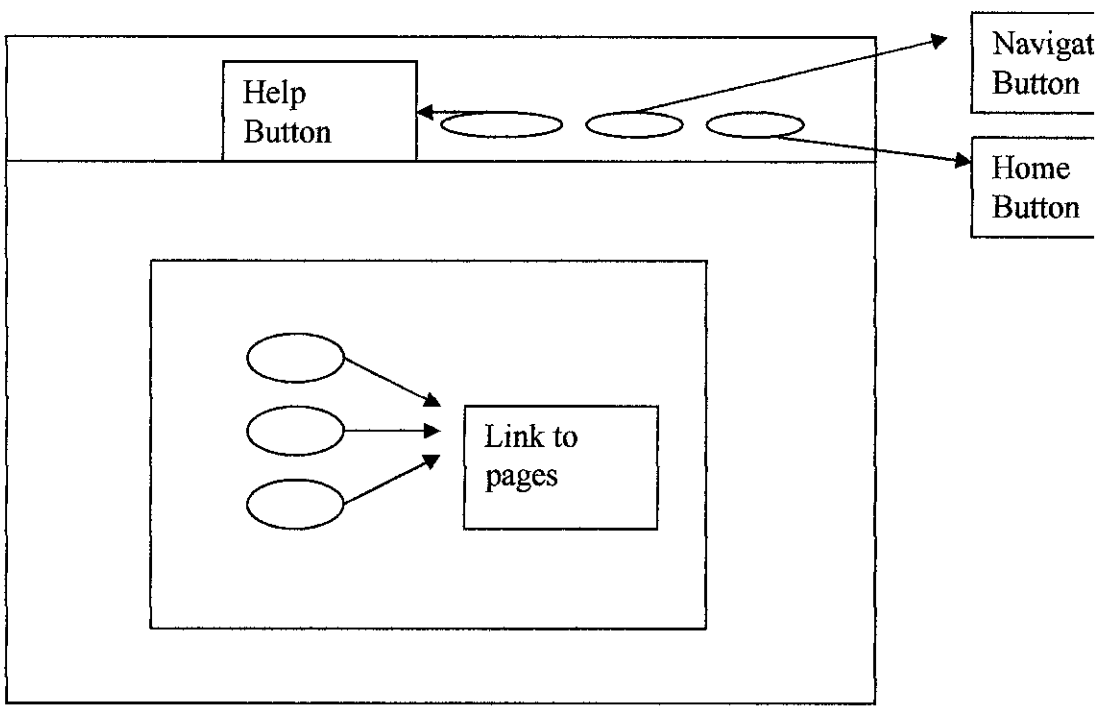
10. Organize the Screen to Manage Complexity.

Elimination of unnecessary information can greatly simplify a screen design. A balanced layout of the display should avoid having too much information at the top or bottom, left or right of the screen

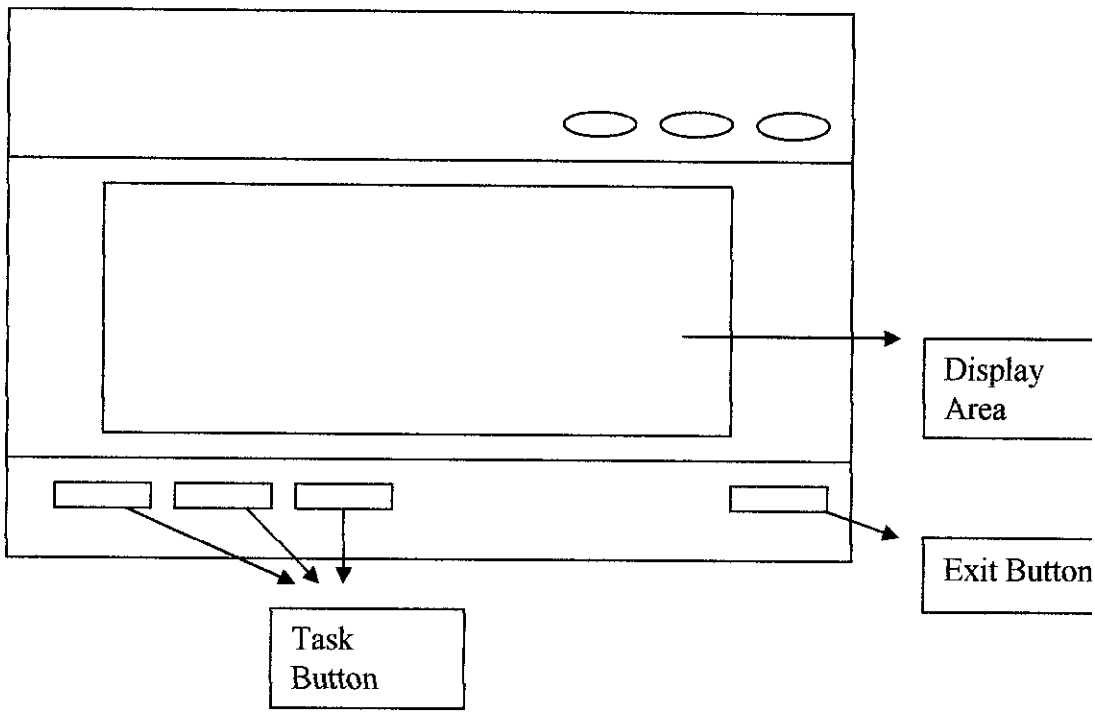
4.0.2.2 Conceptual Design Phase Results

In this phase, the refined set of interface is created based on the thorough research, which has been done earlier.

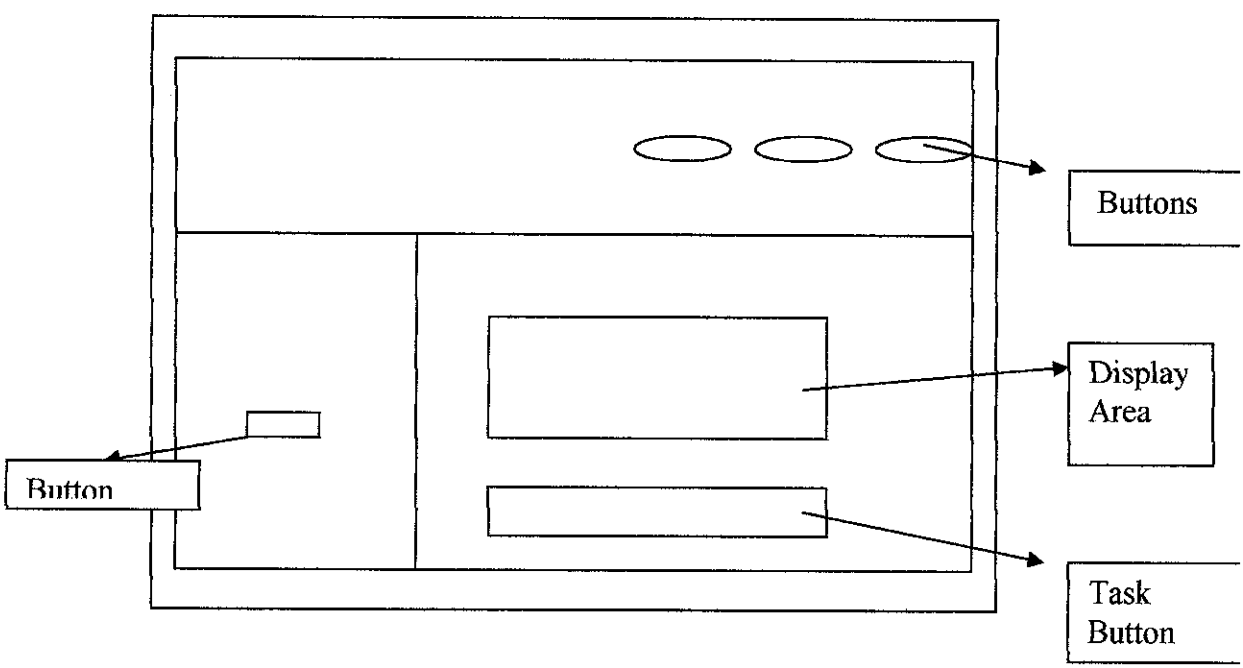




Menu Page Layout



Display Area 1



Display Area

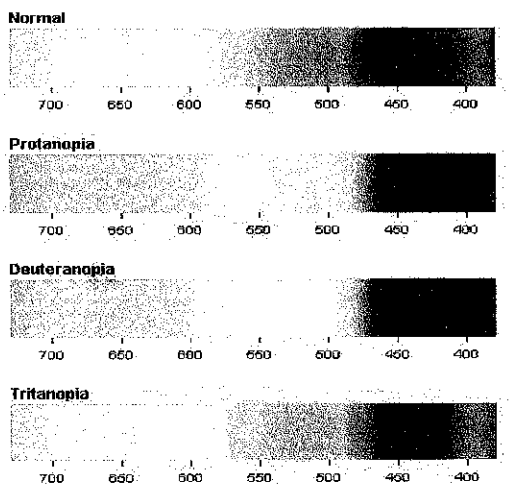
RESULTS AND DISCUSSION

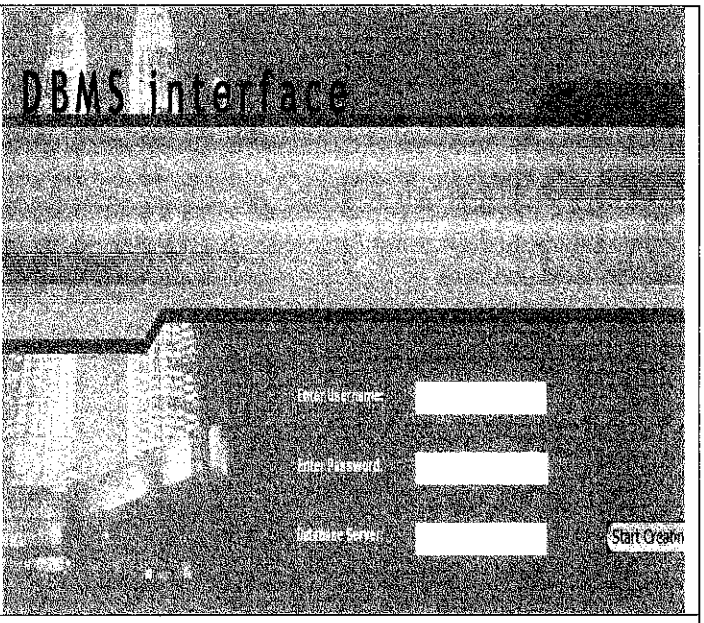
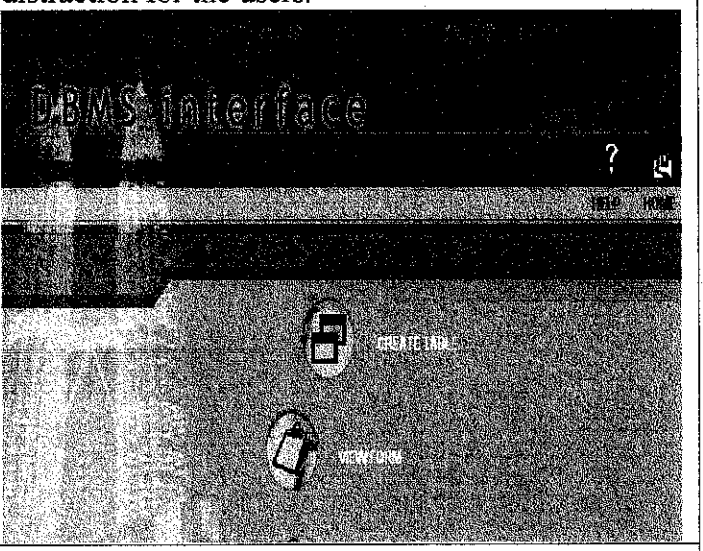
Applying the guidelines to the development of the storyboard.

Guidelines	**Analysis results on the implementation of the guidelines to the development of the storyboard**
Consistency and colors	Certain aspects of an interface should behave in consistent ways at all times for all screens. For example, icons, which are one of the interface metaphors, should be consistent between screens. To avoid misinterpretation and misunderstanding, the same icons need to be used for all the screens. Besides, in order to assist user's understanding, colors should be consistent between screens of similar functions. *Design focus* Do not use too many colors, as it will decrease the effect of the colors. The physical design of the prototype should also include considerations on the color-challenged people.
Simplicity and managing complexity	Task is simplified by using icons, words or other objects that are familiar to the user. This come the roles of metaphor. Icon is pictographic symbols – focus on essential features. It represents underlying objects data structures processes in a form, which corresponds to the real world. The most important icons for the DBMS interface are the symbols of creating a database, view of the database and the report generating icons.
Human memory limitations	Based on the observation and through information gathering, one of the factor that do influence people in retrieving information efficiently is because the matter of 'to many to absorb'. The TOAD software interface has too many icons, which are not categorized in order and often are confusing.

Limit the usage of opening new browser window	Avoid linking to another window which can often be distracting to users

4.0.3 Physical Design Phase Result

Elements	Physical Design
Colors and Consistency	The color used in the prototype took some mild consideration on the color-challenged users. Color is increasingly used these days to help convey information. When one in twelve men have some measurable degree of color vision deficiency, the use of certain colors in certain ways can cause difficulty when navigating web pages or software, and even total illegibility in some cases. The spectrum as perceived by individuals with normal color vision, protanopia, deuteranopia and tritanopia  From the data analysis by Thomas G. Wolfmaier above, it can be concluded that the light blue color is the most appropriate color to be chosen as the background as it can be perceived by almost all type of color-challenged people. Thus the design of the layout is as below

	
Simplicity and managing complexity	The layout of the interface is the same and consistent among the pages to avoid confusion and distraction for the users. 
Human memory limitations	The icons and buttons are placed accordingly and situated from left to right according to the importance of the buttons to make it easier for people to read. This consideration is based on the theory of people read from left to right
Limit the usage of opening new browser window	The prototype created does not link the user to any separate windows to ensure that it will not distract the user. This is a safe guideline to follow, as sometimes users did not realize that they have opened another window.

4.0.4 Testing Phase Result

As proposed earlier in the methodology, there are 3 steps taken in accomplishing the testing phase. Firstly is by developing the test plan to determine the goal for the testing phase. Secondly, from the developed test plan, the actual testing phase is done and lastly the summarization of the data gathered to further improve the interface. Analysts and designers often have the impression that usability evaluation is something very expensive and complex, which is only feasible if working in a high-profile system for a major software vendor with a sophisticated usability laboratory and teams of 'human factors' experts. Note that, it is feasible to perform worthwhile usability evaluations on ordinary application software with limited budget and user expertise.

Usability is a field in which the 80/20 rules apply. This means that the derivation of 80 percent of the benefit of testing is from 20 percent of the cost, with further improvements becoming progressively more expensive.

The type of testing that will be used here is the 'formative evaluation', which is where evaluation feeds back into the design process. Evaluation of this type is crucial to iterative redesign.

4.0.4.1 Develop test plan

The development of the test plan is to achieve certain goal on the interface which is to identify usability problems, to assess whether the GUI design satisfies usability requirements and to evaluate whether the GUI design will be usable in practice by its intended users.

The evaluation frequently uncovers usability problems, which are not noticed during informal interactive prototyping and it exposes the author to real users in a situation, which helps designers understand the user point of view. Evaluation provides the information base for deciding whether GUI design and prototyping is complete. If usability goals are met, and there are no serious usability problems discovered, development can be considered complete. Alternatively, the evaluation results indicate where redesign is required. A positive side effect is that

involving users in evaluation frequently increases user interest and acceptance of the proposed system.

The test plan

User testing/observation of users.

Typical end-users are given task scenarios and observed to see how they perform the tasks using the GUI, what error they make, how long the tasks take and etc. This will be included in the appendixes section.

Observation produces rich qualitative data and can produce quantitative data and from the observation some information has been gathered.

Elements	**Comments**	**Solution**
1. Color	Too dull and the text does not interact well with the background	Change of colors to a more lively color and background
2. Icons and metaphors	Overall satisfy the users because	Optimize more the usage of the icons
3.Information organization	The layout is more convenient but need to have less frameset as it is not agronomical to the user interface	The layout screens have been edited and include only 2 framesets.
4.Consistency	The consistency is okay but the tables need to be re-aligned so that it is standardized among the interface.	Re-align the tables and layers so that it will be standardized among the interface
5. Placement of buttons	The placement of buttons need to be clustered and placed where it is easier to see	Re-arrangement of buttons so that it will fit in the screen

From the information gathered, the prototype has been edited to meet the user requirements. This is an iterative process in which the layout of the interface needs to be refined in order to meet user's expectation.

Survey of users.

Users are surveyed using questionnaire 2 (please refer to the Appendix 2) and with structured interview. In this case, the users will be asked to answer a number of questions. The questions need to be phrased very carefully to avoid biasing the responses. The questions can be put into four categories, which are from the satisfaction, effectiveness, simplicity and information organization aspects.

Satisfaction Aspects

Questions are based on the question number 1, 14 and 15 in the Questionnaire 2.

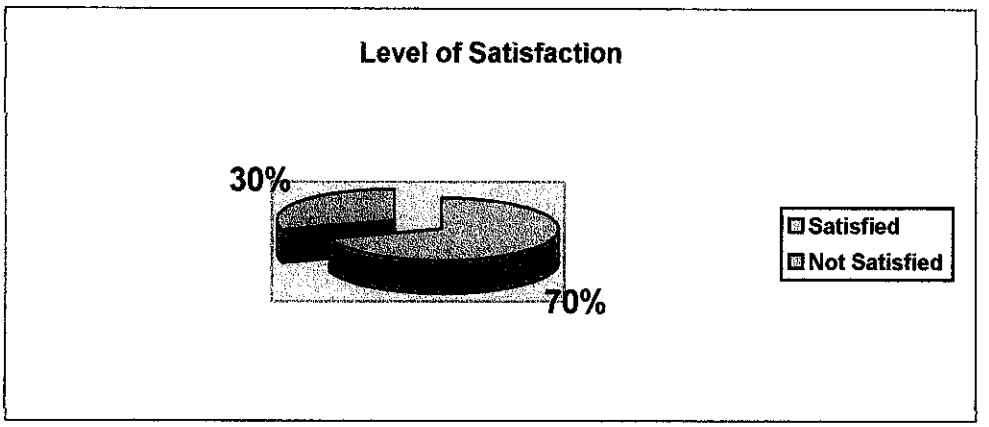


Figure 1

From the survey, it is shown that 70% of the user are satisfied with the interface while 20% said that it needs further improvement and a minimum of 10% are not satisfied with it as they wanted it to be functional so that they can perform the task easily.

Effectiveness

Questions are based on the question number 3, 4, 7, 8 and 12.

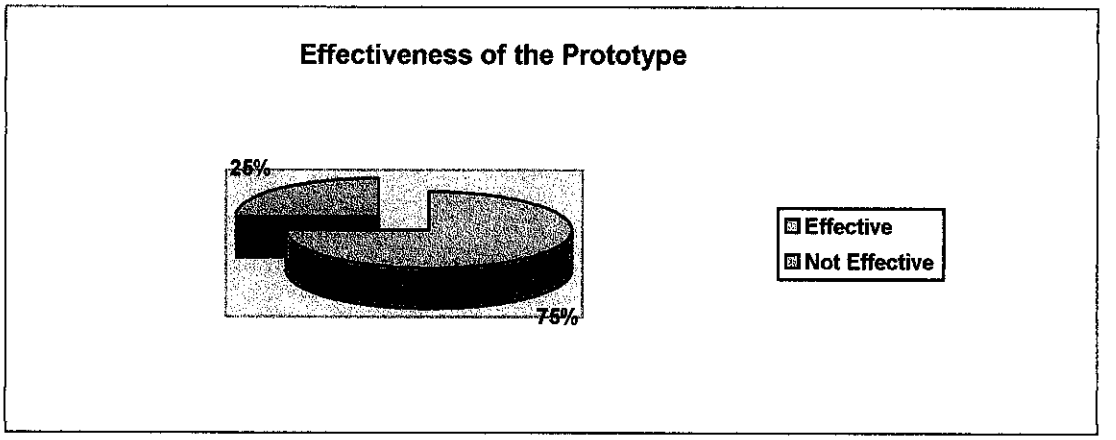


Figure 2

75% of the users find the prototype easier to use and are able to improve the efficiency in dealing with the tasks while 25% said that the prototype is not effective. Further editing of the interface will be done in order to satisfy the user's needs.

Simplicity

Questions are based on the questions number 2, 5, 6 and 11.

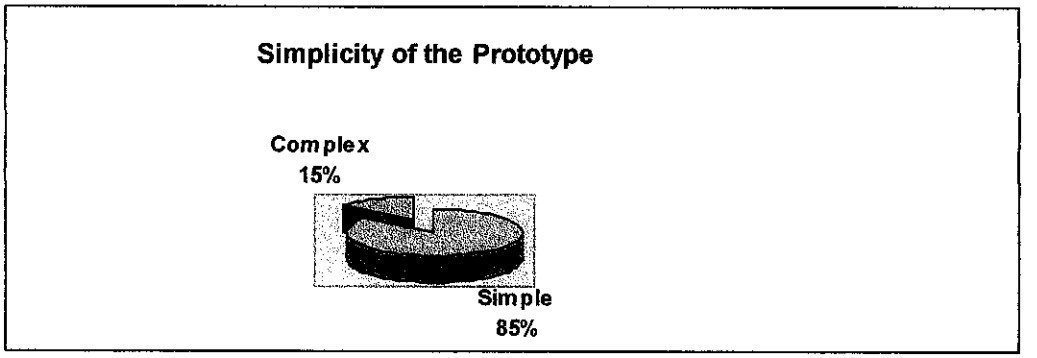


Figure 3

85% of the users find that the prototype is simple to use without any hassle and 15% suggests that the prototype is considered complex to use.

Information Organization

Questions are based on questions number 9, 10 and 13

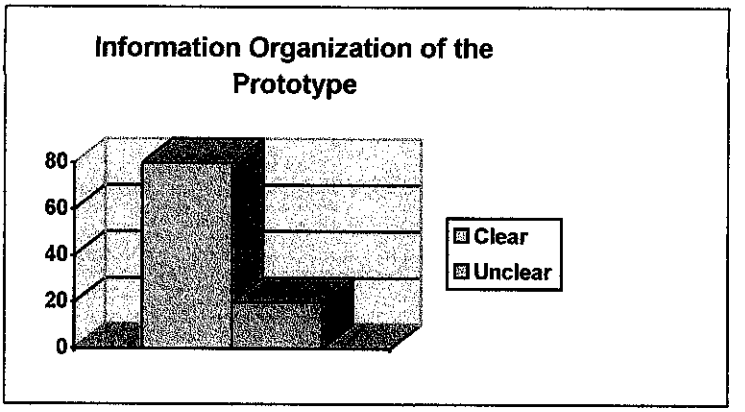


Figure 4

Based on the chart above, it is clearly shown that the organization of the information is clear and 80% of the users are satisfied with it while a minimum of 20% stated that the displayed information is not clear enough in assisting them with the task.

The last testing is done to compare the TOAD software with the current prototyped. This is done with the usage of the Questionnaire 3 (Please refer to Questionnaire 3 in the Appendix 3)

1) You felt extremely comfortable using the interface.

Relevance: User comfort level builds confidence.

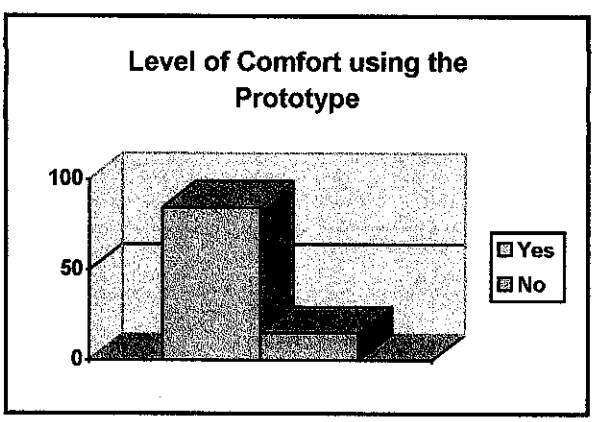


Figure 1

2) The information given in the prototype was sufficient.

Relevance: Allows user input on the value of the information.

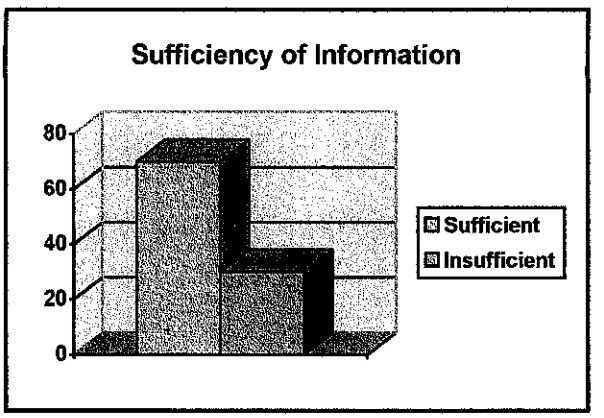


Figure 2

3) Page layouts arranged the information in a logical manner.

Relevance: Conveys information about how well the information is organized.

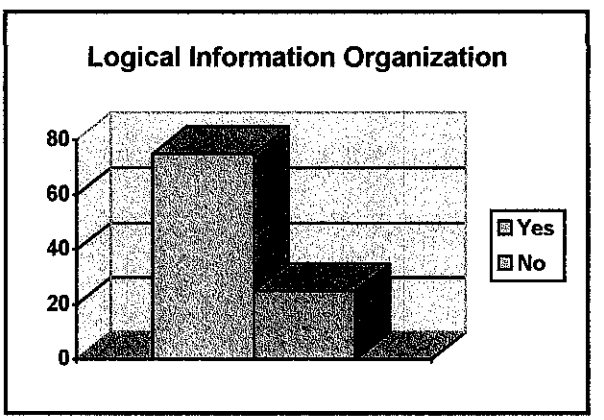


Figure 3

4) The interface was easily understandable.

Relevance: Provides for user input on how simple the interface is.

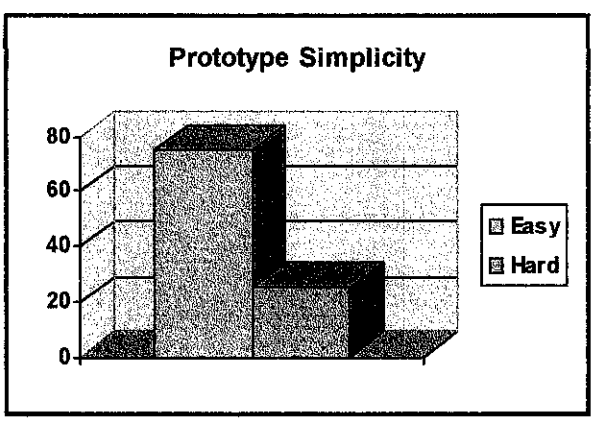


Figure 4

5) Maneuvering through the interface was very simple.

Relevance: Question concerning the interface's ease of use.

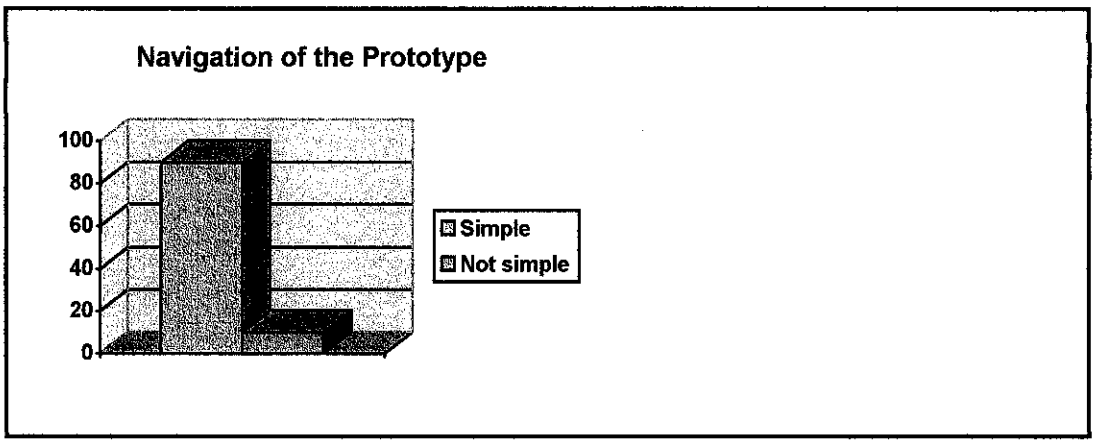
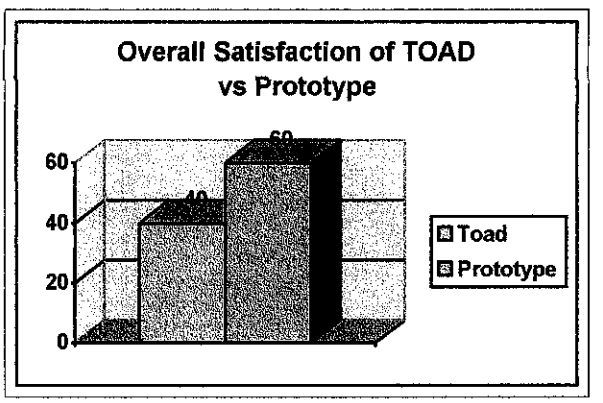


Figure 5

6) Overall satisfaction of the interface

Relevance: To measure overall satisfaction.



It has shown that the level of satisfaction increases when using the prototype and this is due to the effectiveness of integrating the HCI elements with the User Interface design, which produced efficiency in the interface. Although, it is not functional as the real TOAD software, it is believed that it will be easier if the interface can be integrated with the actual database.

RESULTS AND DISCUSSION

Basically, the prototype defined the hypothesis gathered during the theory development phase. These are the Hypothesis in the theory development phase:

1. If elements, HCI elements and the UI elements are integrated efficiently, the DBMS interface will produce a refined interface – Hypothesis is confirmed
2. Usage of colors will effect the user's perception on the interface and how significantly will it affect the interface – Hypothesis is confirmed
3. Users who have more experienced and more exposure to the areas of the interfaces will be able to detect, discover and feel the weaknesses of the interfaces and the significance of a refined interface – Hypothesis is confirmed
4. There is a major difference in the TOAD software and the prototype created and many aspects of both HCI and the UI design elements – Hypothesis is confirmed

CHAPTER 5
CONCLUSION AND RECOMMENDATION

5.1 Relevancy to the Objectives

The research title has given a brief idea on what the project is about. The issues arose is based on the Interface Design on the existing DBMS software which exist to help DBMS users to manage their system. Designers seem to neglect the existence of the HCI elements in designing their interfaces. This is the problem, which bring the author to undergo a small-scale study on the elements of HCI and integrates it with the User Interface design, which is, then can be used to produce a user-friendly interface.

There are three objectives of the project mentioned earlier in the report. The first objective is to research about the use and effect of HCI in user interfaces design to the users. Author had done the research and documented it in the literature review of the report. The result was good and author gained a lot from it.

The second objective is to identify and compile a guideline to assist interface designers in developing a user interface. The guidelines are obtained from a various sources such as the Internet, books and research paper. There also several guidelines that author added later resulting from the experienced gained when developing the prototype.

The last objective of the project is to develop a prototype of the User Interface for the application user-friendly. Author has developed the prototype of the system by using HCI guidelines gained from the research works.

Basically, this research is based on the psychology and design elements. Psychology has much more to offer to interactive system designers. Even though some of the application theory is simple, for instance, color selection, icons and buttons selection but they are still

many issues need to be addressed. This is where; the guidelines serve as the principle in developing the prototype.

5.2 Recommendation

The author hopes that later the interface and its designers could cater or consider the design for a user-friendly design for all types of users. It is also hope that, functionality is the main concern for the future development as the current prototype only shows the sequence of actions in mock up manner. A lot of things need to be added to improve the interface so that it will functional.

For this project, the author focuses on the usage of user-friendly system and the design constraints. Means, the author hopes that in future, the interface designers or programmers could include some functions which been embedded in their system which allow users to select mod of display or other action despite reports in their system.

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APPENDICES

APPENDIX 1

PRE-TEST QUESTIONNAIRE
Questionnaire 1
Interface Design for DBMS

In order to complete this research, a pre- test questionnaire is constructed as to collect respond from users due to the current DBMS interface, TOAD for Oracle application. The purpose of this questionnaire is also to have an overview on how does the HCI elements really effect the information perceived from the interface.

To enable this research to be completed, I would like to have users feedbacks in certain areas. Your cooperation is highly appreciated.

1. Have you had any experience of using a DBMS interface of any kind?

☐ Yes ☐ No

2. How do you find the interface?

☐ Effective ☐ Not effective ☐ Others: _____

3. Do the buttons and icons represent the appropriate task?

☐ Yes ☐ No

4. If no, why does the button or icon did not represent the appropriate task?

_____

5. Is it easy to find information needed in completing a task?

☐ Yes ☐ No

6. How do you want the information to be displayed on the interface?

☐ Details so it will be informative ☐ Necessary information only

☐ Less details but sufficient ☐ Just put all the available information

7. Overall, I am satisfied with this interface?

☐ Yes ☐ Quite satisfied ☐ No

APPENDIX 2

POST-TEST QUESTIONNAIRE
Questionnaire 2
Interface Design for DBMS

Please rate the usability of questioned interface.

- Try to respond to all the items.
- Make sure these fields are filled in:
- Add a comment

1. Overall, I am satisfied with how easy it is to use this interface	DISAGREE	○	○	○	○	○	AGREE ○
2. It was simple to use this interface	DISAGREE	○	○	○	○	○	AGREE ○
3. I can effectively complete my work using this interface	DISAGREE	○	○	○	○	○	AGREE ○
4. I am able to complete my work quickly using this interface	DISAGREE	○	○	○	○	○	AGREE ○
5. I feel comfortable using this interface	DISAGREE	○	○	○	○	○	AGREE ○
6. It was easy to learn to use this interface	DISAGREE	○	○	○	○	○	AGREE ○
7. The interface gives error messages that clearly tell me how to fix problems	DISAGREE	○	○	○	○	○	AGREE ○
8. Whenever I make a mistake using the interface, I recover easily and quickly	DISAGREE	○	○	○	○	○	AGREE ○
9. The information (such as help menu, on-screen messages, and other documentation) provided with this interface is clear	DISAGREE	○	○	○	○	○	AGREE ○
10. It is easy to find the information I needed	DISAGREE	○	○	○	○	○	AGREE ○
11. The information provided for the interface is easy to understand	DISAGREE	○	○	○	○	○	AGREE ○
12. The information is effective in helping me complete the tasks and scenarios	DISAGREE	○	○	○	○	○	AGREE ○
13. The organization of information on the interface screens is clear	DISAGREE	○	○	○	○	○	AGREE ○
14. I like using the interface of this DBMS	DISAGREE	○	○	○	○	○	AGREE ○
15. This interface has all the functions	DISAGREE	○	○	○	○	○	AGREE ○

and capabilities I expect it to have

16. Overall, I am satisfied with this interface

DISAGREE ○ ○ ○ ○ ○ AGREE ○

-2	-1	0	1	2	N/A